

The diagram illustrates a color change detecting device. It begins with an **IMAGE CAPTURING ELEMENT** (1) which feeds into an **A/D** converter (2). The output of the A/D converter is split: one path goes through a series of **LINE MEMORY** blocks (3, 4, 5, 6, 7) labeled **Line1** through **Line6**. The other path from the A/D converter goes to an adder (8). The signal from the first line memory (3) also goes to adder (8). The output of adder (8) passes through an **LPF** (11). This pattern repeats for the subsequent line memories and adders (9, 10) and LPFs (12, 13). These LPF outputs are fed into the **ADAPTIVE LPF PART** (21). Inside this part, the signals are processed through a series of operations: a multiplier ($\times 2$), a subtractor ($-$), and an adder ($+$). The output of the adaptive LPF part is fed into the **COLOR CHANGE DETECTING PART** (15). The **COLOR CHANGE DETECTING PART** also receives direct inputs from the line memories (3, 4, 5, 6, 7). The output of the color change detecting part is fed back into the **CORE PROCESSING PART** (20) and also serves as the final output **Line6**. The **CORE PROCESSING PART** (20) has an **in** terminal and an **out** terminal, with the output being fed back into the adaptive LPF part.

Fig. 2

Mg	Gr
Ye	Cy
Gr	Mg
Ye	Cy

Fig. 3

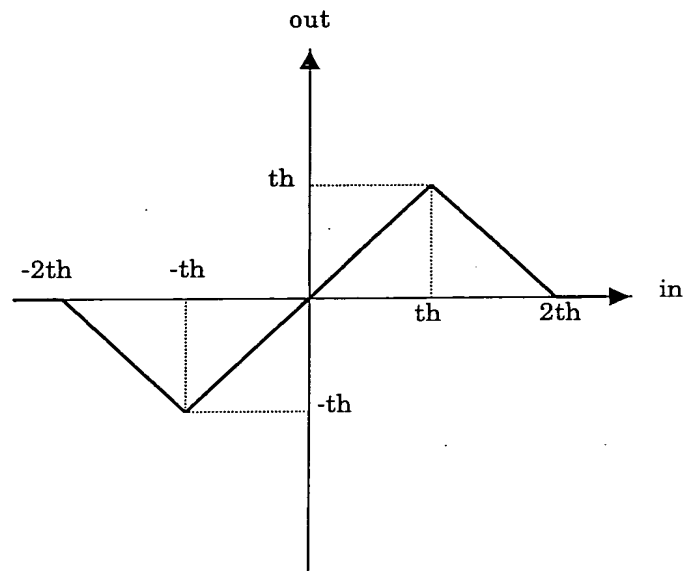


Fig. 4

Line2	→	1	1
Line3	→	-1	-1
Line4	→	-1	-1
Line5	→	1	1

Fig. 5 (a)

Line2	→	0	0
Line3	→	2	2
Line4	→	2	2
Line5	→	0	0

WHERE $2 \times th < |in|$ IS SATISFIED

Fig. 5 (b)

Line2	→	$1/3$	$1/3$
Line3	→	$5/3$	$5/3$
Line4	→	$5/3$	$5/3$
Line5	→	$1/3$	$1/3$

WHERE $|in| = 1.5 \times th$ IS SATISFIED

Fig. 5 (c)

Line2	→	1	1
Line3	→	1	1
Line4	→	1	1
Line5	→	1	1

WHERE $|in| < th$ IS SATISFIED

Fig. 6

	m-2	m-1	m	m+1	m+2	m+3
n-2	Gr (m-2, n-2)	Mg (m-1, n-2)	Gr (m, n-2)	Mg (m+1, n-2)	Gr (m+2, n-2)	Mg (m+3, n-2)
n-1	Ye (m-2, n-1)	Cy (m-1, n-1)	Ye (m, n-1)	Cy (m+1, n-1)	Ye (m+2, n-1)	Cy (m+3, n-1)
n	Mg (m-2, n)	Gr (m-1, n)	Mg (m,n)	Gr (m+1, n)	Mg (m+2, n)	Gr (m+3, n)
n+1	Ye (m-2, n+1)	Cy (m-1, n+1)	Ye (m, n+1)	Cy (m+1, n+1)	Ye (m+2, n+1)	Cy (m+3, n+1)
n+2	Gr (m-2, n+2)	Mg (m-1, n+2)	Gr (m, n+2)	Mg (m+1, n+2)	Gr (m+2, n+2)	Mg (m+3, n+2)
n+3	Ye (m-2, n+3)	Cy (m-1, n+3)	Ye (m, n+3)	Cy (m+1, n+3)	Ye (m+2, n+3)	Cy (m+3, n+3)

Fig. 7

	m-2	m-1	m	m+1	m+2	m+3
n-2	0	1	0	0	0	0
n-1	1	0	1	0	0	0
n	1	0	1	0	0	0
n+1	1	0	1	0	0	0
n+2	0	1	0	0	0	0
n+3	1	0	1	0	0	0

Mg=1,
Gr=0,
Ye=1,
Cy=0

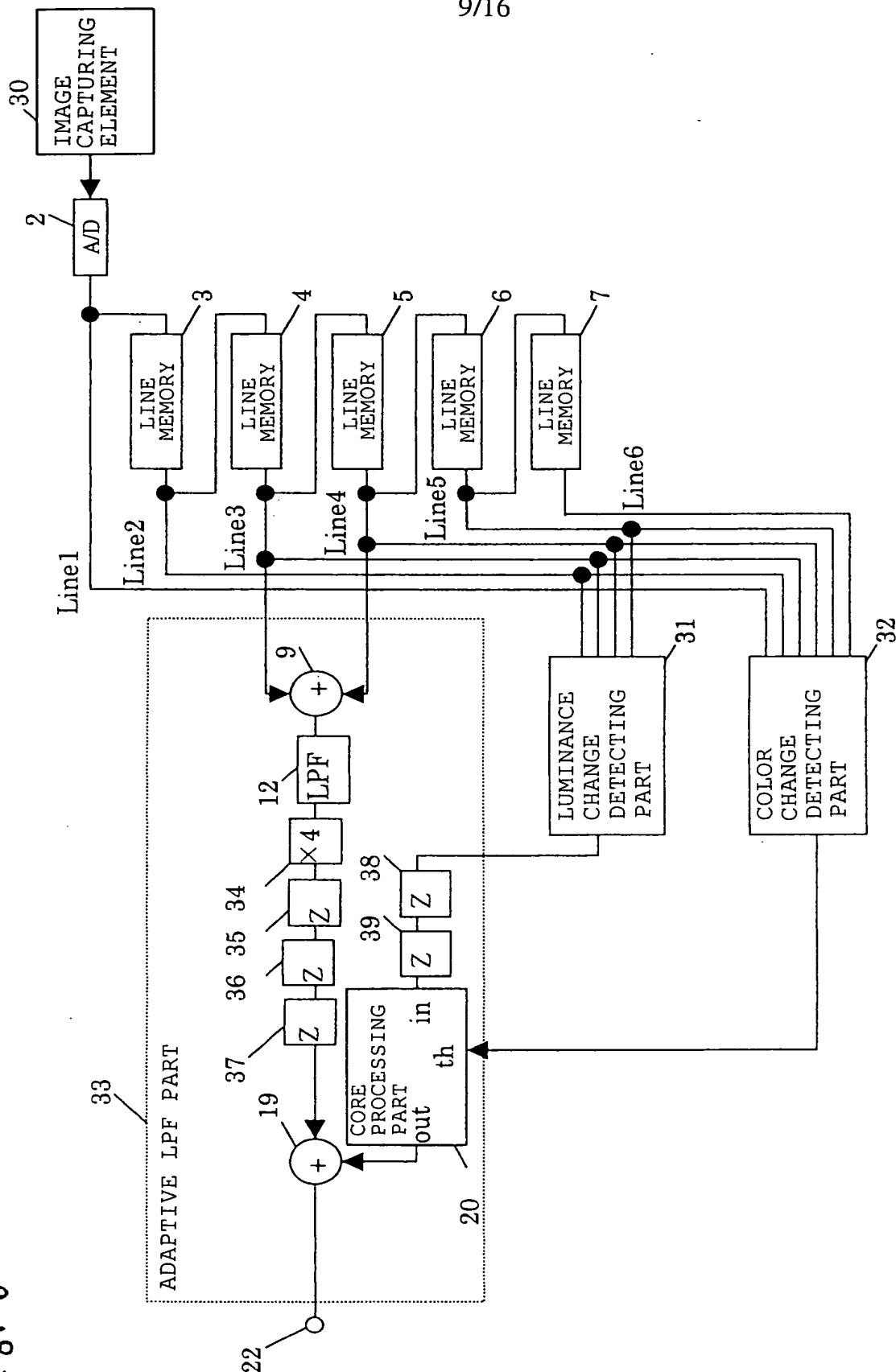
Mg=0,
Gr=0,
Ye=0,
Cy=0

Fig. 8

	m-2	m-1	m	m+1	m+2	m+3
n-2	G0	M0	G1	M2	G3	M3
n-1	Y0	C0	Y1	C2	Y3	C3
n	M0	G0	M1	G2	M3	G3
n+1	Y0	C0	Y1	C2	Y3	C3
n+2	G0	M0	G1	M2	G3	M3
n+3	Y0	C0	Y1	C2	Y3	C3

Mg=M0	Mg=M1	Mg=M2	Mg=M3
Gr=G0	Gr=G1	Gr=G2	Gr=G3
Ye=Y0	Ye=Y1	Ye=Y2	Ye=Y3
Cy=C0	Cy=C1	Cy=C2	Cy=C3

Fig. 9



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Fig. 10

R	Gr
Gr	B

Fig. 11

	m-2	m-1	m	m+1	m+2	m+3
n-2	Gr (m-2, n-2)	R (m-1,n-2)	Gr (m,n-2)	R (m+1,n-2)	Gr (m+2,n-2)	R (m+3,n-2)
n-1	B (m-2,n-1)	Gr (m-1,n-1)	B (m,n-1)	Gr (m+1,n-1)	B (m+2,n-1)	Gr (m+3,n-1)
n	Gr (m-2,n)	R (m-1,n)	Gr(m,n)	R (m+1,n)	Gr (m+2,n)	R (m+3,n)
n+1	B (m-2,n+1)	Gr (m-1,n+1)	B (m,n+1)	Gr(m+1, n+1)	B (m+2,n+1)	Gr (m+3,n+1)
n+2	Gr (m-2,n+2)	R (m-1,n+2)	Gr (m,n+2)	R (m+1,n+2)	Gr (m+2,n+2)	R (m+3,n+2)
n+3	B (m-2,n+3)	Gr (m-1,n+3)	B (m,n+3)	Gr (m+1,n+3)	B (m+2,n+3)	Gr (m+3,n+3)

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Fig. 12

R=0,
Gr=0,
B=1

	m-2	m-1	m	m+1	m+2	m+3
n-2	0	0	0	0	0	0
n-1	0	0	1	0	1	0
n	0	1	0	0	0	0
n+1	0	0	0	0	1	0
n+2	0	1	0	1	0	0
n+3	0	0	0	0	0	0

R=1,
Gr=0,
B=0

Fig. 13 (a)

Line2	→	0	1	0	0
Line3	→	1	0	-2	0
Line4	→	0	-2	0	1
Line5	→	0	0	1	0

Fig. 13 (b)

Line2	→	0	0	1	0
Line3	→	0	-2	0	1
Line4	→	1	0	-2	0
Line5	→	0	1	0	0

Fig. 14

Line2	→	0	0	0	0
Line3	→	0	4	4	0
Line4	→	0	4	4	0
Line5	→	0	0	0	0

Fig. 15 (a)

Line2	→	0	0	0	0
Line3	→	0	4	4	0
Line4	→	0	4	4	0
Line5	→	0	0	0	0

WHERE $2 \times th < |in|$ IS SATISFIED

Fig. 15 (b)

Line2	→	0	1/3	0	0
Line3	→	1/3	4	10/3	0
Line4	→	0	10/3	4	1/3
Line5	→	0	0	1/3	0

WHERE $|in| = 1.5 \times th$ IS SATISFIED

Fig. 15 (c)

Line2	→	0	0	1/3	0
Line3	→	0	10/3	4	1/3
Line4	→	1/3	4	10/3	0
Line5	→	0	1/3	0	0

WHERE $|in| = 1.5 \times th$ IS SATISFIED

Fig. 15 (d)

Line2	→	0	1	0	0
Line3	→	1	4	2	0
Line4	→	0	2	4	1
Line5	→	0	0	1	0

WHERE $|in| \leq th$ IS SATISFIED

Fig. 15 (e)

Line2	→	0	0	1	0
Line3	→	0	2	4	1
Line4	→	1	4	2	0
Line5	→	0	1	0	0

WHERE $|in| \leq th$ IS SATISFIED

Fig. 16 (a)

0	0	0	0	0	1	0	1
0	0	0	0	-1	0	-1	0
0	-1	0	-1	0	0	0	0
1	0	1	0	0	0	0	0

Fig. 16 (b)

0	0	0	0	1	0	1	0
0	0	0	0	0	-1	0	-1
-1	0	-1	0	0	0	0	0
0	1	0	1	0	0	0	0

Fig. 16 (c)

0	1	0	1	0	0	0	0
-1	0	-1	0	0	0	0	0
0	0	0	0	0	-1	0	-1
0	0	0	0	1	0	1	0

Fig. 16 (d)

1	0	1	0	0	0	0	0
0	-1	0	-1	0	0	0	0
0	0	0	0	-1	0	-1	0
0	0	0	0	0	1	0	1